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10/738,332	12/17/2003	Carolus Matthias Anna Maria Mesters	TS1313 (US)	7939
Yukiko Iwata Shell Oil Company Legal - Intellectual Property P.O. Box 2463 Houston, TX 77252-2463				
7590 10/21/2010			EXAMINER BOYER, RANDY	
			ART UNIT 1771	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/738,332

Applicant(s)

MESTERS ET AL.

Examiner

RANDY BOYER

Art Unit

1771

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 9, 11-21, 24-26, 30 and 33-94 is/are pending in the application.
- 4a) Of the above claim(s) 54-64 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 9, 11-21, 24-26, 30, 33-53 and 65-94 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 27 August 2010 has been entered.

### ***Response to Amendment***

2. Examiner acknowledges Applicant's response filed 27 August 2010 containing amendments to the claims and remarks.
3. Claims 1, 2, 9, 11-21, 24-26, 30, and 33-94 are pending. Claims 65-94 are newly added. Claims 54-64 are withdrawn from consideration (see Office Action mailed 5 April 2010, paragraph 7). Consequently, only claims 1, 2, 9, 11-21, 24-26, 30, 33-53, and 65-94 are pending for examination.
4. Applicant's amendments to claims 46, 49, and 52 are sufficient to overcome the previous rejections under 35 U.S.C. 112, first paragraph.
5. All previous grounds for rejection under 35 U.S.C. 103(a) are withdrawn in view of Examiner's reconsideration of the record and newly discovered prior art. Likewise,

the previous indication of allowability with respect to claims 45, 47, 48, 50, 51, and 53 is withdrawn.

6. New (modified) grounds for rejection are entered under 35 U.S.C. 103(a) for all previously pending claims and newly added claims. No claims are allowed. The rejections follow.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 2, 9, 11-21, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frame (US 3,978,137) in view of Yoo (US 3,945,914), Mahadev (WO 92/20621), and Mackrodt (US 5,137,862).

11. With respect to claims 1, 2, 9, 11-19, 21, and 24, Frame discloses a process comprising contacting a hydrocarbon feedstock containing mercaptan compounds with air and a catalyst comprising platinum, rhodium, or iridium on a zirconia support at a temperature between about 50°C and about 400°C at a pressure of about 1 atm (see Frame, column 1, lines 4-12; column 2, lines 42-45; column 3, lines 1-19; and column 4, lines 10-13 and 60-65).

Frame does not explicitly disclose wherein the feed is a gaseous feedstock containing at most 5 vol% hydrogen sulfide and where the feed mixed with the oxygen-containing gas has an oxygen-carbon ratio below 0.10. Frame also does not explicitly disclose wherein the platinum, rhodium, or iridium are present at a concentration in the range from 0.02% to 10% based on the weight of the catalyst; or wherein the zirconia support is one that has been stabilized or partially stabilized with yttria.

However, Mahadev discloses a feed stream of natural gas containing up to 10 wt% hydrogen sulfide (see Mahadev, page 1, lines 21-24; and page 2, lines 3-9). Mahadev explains that the adsorptive capacity of the catalyst remains unchanged for

feeds with less than 10 wt% of hydrogen sulfide (see Mahadev, page 32, lines 3-9). In addition, Yoo explains that a hydrocarbon feed mixture of oxygen-containing has an oxygen-sulfur ration of about 0.5 with the sulfur content of the feed being about 1 wt%. Because hydrocarbons comprise carbon atoms, 99% of the feed would contain carbon atoms. Thus, the oxygen-carbon ratio of the feed would be approximately 0.005 (see Yoo, column 1, lines 64-68; and column 2, lines 46-63). Yoo further explains that the concentration of oxidant is usually dependent on the amount of sulfur present in the hydrocarbon material (see Yoo, column 2, lines 46-53). Finally, Mackrodt notes that yttria is conventionally incorporated into zirconia supports as a means of stabilizing the zirconia against the phase change and accompanying volume expansion of unstabilized zirconia at elevated temperatures (see Mackrodt, column 4, lines 2-7).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Frame to include a feed stream of natural gas containing up to 10 wt% hydrogen sulfide (as taught by Mahadev) in order to preserve the adsorptive capacity of the catalyst. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Frame to provide an oxygen-carbon ration of the feed of approximately 0.005 since the amount of oxygen present in the feed is dependent upon the amount of sulfur present in the feed (as evidenced by Yoo).

With respect to the claimed concentration of metals present in the catalyst, Examiner notes that differences in concentration will generally not support the

patentability of subject matter encompassed by the prior art unless there is evidence to establish that such concentration is critical. See MPEP § 2144.05(II)(A).

Finally, with respect to Applicant's previous amendment of the transitional phrase "comprises" to "consisting essentially of" to introduce the catalyst composition to be used in the claimed process, Examiner notes that "for the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication of what the basic and novel characteristics [of the claimed invention] actually are, 'consisting essentially of' will be construed as equivalent to 'comprising.'" See MPEP § 2111.03.

12. With respect to claim 20, Mahadev discloses a flue gas having a concentration of sulfur dioxide in the range of 1000 ppm to 2000 ppm (see Mahadev, page 17, lines 7-9).

13. Claims 46, 47, 49, 50, 70-74, and 80-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frame (US 3,978,137) in view of Yoo (US 3,945,914), Mahadev (WO 92/20621), and Madgavkar (US 4,382,912).

14. With respect to claims 46, 47, 49, 50, 70-74, and 80-84, Frame discloses a process comprising contacting a hydrocarbon feedstock containing mercaptan compounds with air and a catalyst comprising platinum, rhodium, or iridium on a zirconia support at a temperature between about 50°C and about 400°C at a pressure of about 1 atm (see Frame, column 1, lines 4-12; column 2, lines 42-45; column 3, lines 1-19; and column 4, lines 10-13 and 60-65).

Frame does not explicitly disclose wherein the feed is a gaseous feedstock containing at most 5 vol% hydrogen sulfide and where the feed mixed with the oxygen-containing gas has an oxygen-carbon ratio below 0.10. Frame also does not explicitly

disclose wherein the platinum, rhodium, or iridium are present at a concentration in the range from 0.02% to 10% based on the weight of the catalyst; or wherein the support is a non-refractory oxide bulk material.

However, Mahadev discloses a feed stream of natural gas containing up to 10 wt% hydrogen sulfide (see Mahadev, page 1, lines 21-24; and page 2, lines 3-9). Mahadev explains that the adsorptive capacity of the catalyst remains unchanged for feeds with less than 10 wt% of hydrogen sulfide (see Mahadev, page 32, lines 3-9). In addition, Yoo explains that a hydrocarbon feed mixture of oxygen-containing has an oxygen-sulfur ration of about 0.5 with the sulfur content of the feed being about 1 wt%. Because hydrocarbons comprise carbon atoms, 99% of the feed would contain carbon atoms. Thus, the oxygen-carbon ratio of the feed would be approximately 0.005 (see Yoo, column 1, lines 64-68; and column 2, lines 46-63). Yoo further explains that the concentration of oxidant is usually dependent on the amount of sulfur present in the hydrocarbon material (see Yoo, column 2, lines 46-53). Finally, Frame discloses wherein the support material may be selected from among alumina, silica, magnesia, and zirconia (see Frame, column 4, lines 61-64). In this regard, Madgavkar discloses the use of Fecralloy™ as a substitute for the support materials listed in Frame for the purpose of supporting oxidation catalysts (see Madgavkar, column 3, lines 16-37). Applicant admits that Fecralloy™ consists of Fe, Cr, and Al alloy with an alumina and zirconia surface layer (see Applicant's specification, page 4, lines 33-34; and page 5, lines 1-4).



Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Frame to include a feed stream of natural gas containing up to 10 wt% hydrogen sulfide (as taught by Mahadev) in order to preserve the adsorptive capacity of the catalyst. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Frame to provide an oxygen-carbon ration of the feed of approximately 0.005 since the amount of oxygen present in the feed is dependent upon the amount of sulfur present in the feed (as evidenced by Yoo). In addition, it is *prima facie* obvious to substitute one prior art element (Fecralloy™ as the non-refractory bulk oxide) for another prior art element (alumina, silica, magnesia, and zirconia) known to be useful for the exact same purpose (supporting an oxidation catalyst). See MPEP § 2144.06.

With respect to the claimed concentration of metals present in the catalyst, Examiner notes that differences in concentration will generally not support the patentability of subject matter encompassed by the prior art unless there is evidence to establish that such concentration is critical. See MPEP § 2144.05(II)(A).

Finally, with respect to Applicant's previous amendment of the transitional phrase "comprises" to "consisting essentially of" to introduce the catalyst composition to be used in the claimed process, Examiner notes that "for the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication of what the basic and novel characteristics [of the claimed invention] actually are, 'consisting essentially of' will be construed as equivalent to 'comprising.'" See MPEP § 2111.03.

15. Claims 1, 2, 9, 11-21, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Mackrodt (US 5,137,862).

16. With respect to claims 1, 2, 9, 11-21, and 24, De Jong discloses a process comprising: contacting a mixture of a hydrocarbonaceous feedstock (see De Jong, column 4, lines 20-24) containing any of various sulfur compounds (see De Jong, column 4, lines 65-67; and column 5, lines 1-16) in an amount ranging from 0.05 ppm to 100 ppm (see De Jong, column 5, lines 22-26) and an oxygen-containing gas (see De Jong, column 4, lines 30-31) with a catalyst (see De Jong, column 4, lines 65-67), wherein the catalyst may comprise platinum, rhodium, or iridium in the range of 0.01 wt% to 20 wt% (see De Jong, column 6, lines 6-10), supported on a catalyst carrier (e.g., zirconia) (see De Jong, column 6, lines 11-14).

De Jong does not explicitly disclose wherein the contact temperature is at most 500°C or wherein the feed mixture has an oxygen-to-carbon ratio of below 0.15. De Jong also does not explicitly disclose wherein his catalyst carrier is a zirconia that has been stabilized or partially stabilized with yttria.

However, De Jong discloses wherein the process may be operated at any suitable temperature (see De Jong, column 5, line 44; and claim 14) and any suitable pressure (see De Jong, column 5, lines 36-37; and claim 14), and wherein the feed may comprise the hydrocarbon feedstock and oxygen in any amount sufficient to give a suitable oxygen-to-carbon ratio (see De Jong, column 4, lines 50-52). Moreover, De Jong explains that: (1) the level of sulfur compounds in the feed is variable (see De Jong, column 5, lines 22-26); and (2) the desired level of conversion will necessarily

depend upon the severity of the process conditions (temperature, pressure) used (see De Jong, column 5, lines 36-49). Finally De Jong discloses that his catalyst support material may be any of the type that is already known in the art. In this regard, Mackrodt notes that yttria is conventionally incorporated into zirconia supports as a means of stabilizing the zirconia against the phase change and accompanying volume expansion of unstabilized zirconia at elevated temperatures (see Mackrodt, column 4, lines 2-7).

Therefore, Examiner finds Applicant's limitations regarding process temperature and oxygen-to-carbon ration to be of no patentable consequence because: (1) such conditions are not critical to the process of De Jong, i.e. the process of De Jong could conceivably be carried out at any temperature and with any oxygen-to-carbon ratio so long as De Jong's overall objectives were satisfied; and (2) De Jong recognizes process temperature (along with pressure) as a result-effective variable, changes in which will necessarily result in changes to the overall level of conversion of the feedstock components. See MPEP § 2144.05(II)(A),(B).

17. Claims 25, 26, 30, and 33-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Mackrodt (US 5,137,862) and D'Souza (US 4,233,276).

18. With respect to claims 25, 26, 30, and 33-44, see discussion *supra* at paragraph 16.

De Jong discloses wherein the effluent from the oxidation step may be further treated by passing such product stream through a bed of adsorbent suitable for

removing the sulfur-containing components produced in the oxidation step (see De Jong, column 8, lines 11-27).

De Jong does not explicitly disclose wherein the adsorbent is copper oxide or barium oxide.

However, De Jong discloses wherein the adsorbent may be zinc oxide (see De Jong, column 8, line 27) which is an art-recognized substitute for copper oxide and barium oxide as an adsorbent material for the removal of sulfur-containing components in an oxidized stream (see D'Souza, column 6, lines 13-25). In this regard, Examiner notes that the mere substitution of prior art elements known to be useful for the same purpose supports a finding of *prima facie* obviousness. See MPEP § 2144.06.

19. Claims 45, 48, 65-69, and 75-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Mackrodt (US 5,137,862) and Wachs (US 7,374,666).

20. With respect to claims 45, 48, 65-69, and 75-79, see discussion *supra* at paragraph 16.

De Jong does not explicitly disclose wherein the catalyst additionally comprises zirconium and cerium.

However, Wachs discloses that cerium and zirconium are useful adjuvants that may be added to an oxidation catalyst designed for the oxidative desulfurization of a hydrocarbon stream containing sulfur compounds, such additives functioning to enhance catalytic activity of the oxidation catalyst.

Therefore, the person having ordinary skill in the art would have been motivated to modify the oxidation catalyst of De Jong to incorporate zirconium and cerium as activity enhancers. In this regard, Examiner notes that the combination of prior art elements (zirconium, cerium) known to be (individually) useful for the exact same purpose (to enhance the activity of an oxidation catalyst) supports a finding of *prima facie* obviousness. See MPEP § 2144.06.

21. Claims 51 and 85-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Mackrodt (US 5,137,862), D'Souza (US 4,233,276), and Wachs (US 7,374,666).

22. With respect to claims 51 and 85-89, see discussion *supra* at paragraphs 18 and 20.

23. Claims 46, 47, 49, 50, 70-74, and 80-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Madgavkar (US 4,382,912).

24. With respect to claims 46, 47, 49, 50, 70-74, and 80-84, De Jong discloses a process comprising: contacting a mixture of a hydrocarbonaceous feedstock (see De Jong, column 4, lines 20-24) containing any of various sulfur compounds (see De Jong, column 4, lines 65-67; and column 5, lines 1-16) in an amount ranging from 0.05 ppm to 100 ppm (see De Jong, column 5, lines 22-26) and an oxygen-containing gas (see De Jong, column 4, lines 30-31) with a catalyst (see De Jong, column 4, lines 65-67), wherein the catalyst may comprise platinum, rhodium, or iridium in the range of 0.01 wt% to 20 wt% (see De Jong, column 6, lines 6-10), supported on a catalyst carrier (e.g., zirconia) (see De Jong, column 6, lines 11-14).

De Jong does not explicitly disclose wherein the contact temperature is at most 500°C or wherein the feed mixture has an oxygen-to-carbon ratio of below 0.15. De Jong also does not explicitly disclose wherein his catalyst carrier is a non-refractory oxide bulk material.

However, De Jong discloses wherein the process may be operated at any suitable temperature (see De Jong, column 5, line 44; and claim 14) and any suitable pressure (see De Jong, column 5, lines 36-37; and claim 14), and wherein the feed may comprise the hydrocarbon feedstock and oxygen in any amount sufficient to give a suitable oxygen-to-carbon ratio (see De Jong, column 4, lines 50-52). Moreover, De Jong explains that: (1) the level of sulfur compounds in the feed is variable (see De Jong, column 5, lines 22-26); and (2) the desired level of conversion will necessarily depend upon the severity of the process conditions (temperature, pressure) used (see De Jong, column 5, lines 36-49). Finally De Jong discloses that his catalyst support material may be any of the type that is already known in the art. In this regard, Madgavkar discloses the use of Fecralloy™ as a substitute for the support materials listed in De Jong for the purpose of supporting oxidation catalysts (see Madgavkar, column 3, lines 16-37). Applicant admits that Fecralloy™ consists of Fe, Cr, and Al alloy with an alumina and zirconia surface layer (see Applicant's specification, page 4, lines 33-34; and page 5, lines 1-4).

Therefore, Examiner finds Applicant's limitations regarding process temperature and oxygen-to-carbon ration to be of no patentable consequence because: (1) such conditions are not critical to the process of De Jong, i.e. the process of De Jong could

conceivably be carried out at any temperature and with any oxygen-to-carbon ratio so long as De Jong's overall objectives were satisfied; and (2) De Jong recognizes process temperature (along with pressure) as a result-effective variable, changes in which will necessarily result in changes to the overall level of conversion of the feedstock components. See MPEP § 2144.05(II)(A),(B).

25. Claims 52, 53, and 90-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Jong (US 5,720,901) in view of Madgavkar (US 4,382,912) and D'Souza (US 4,233,276).

26. With respect to claims 52, 53, and 90-94, see discussion *supra* at paragraph 24.

De Jong discloses wherein the effluent from the oxidation step may be further treated by passing such product stream through a bed of adsorbent suitable for removing the sulfur-containing components produced in the oxidation step (see De Jong, column 8, lines 11-27).

De Jong does not explicitly disclose wherein the adsorbent is copper oxide or barium oxide.

However, De Jong discloses wherein the adsorbent may be zinc oxide (see De Jong, column 8, line 27) which is an art-recognized substitute for copper oxide and barium oxide as an adsorbent material for the removal of sulfur-containing components in an oxidized stream (see D'Souza, column 6, lines 13-25). In this regard, Examiner notes that the mere substitution of prior art elements known to be useful for the same purpose supports a finding of *prima facie* obviousness. See MPEP § 2144.06.

***Response to Arguments***

27. Applicant's arguments filed 27 August 2010 have been fully considered but they are not persuasive.

28. Examiner understands Applicant's arguments to be:

- I. The modifications of the primary Frame reference in the manner suggested by Examiner using the disclosures of Mahadev and Yoo is not proper.
- II. The processes taught by the secondary references of Mahadev and Yoo are substantially different from the process of Frame and the catalysts, as well, are substantially different.
- III. The Mahadev catalyst is not even remotely similar to the Frame catalyst.
- IV. The Yoo process is a two-step process that is significantly different from the Frame process and the Yoo catalyst is in no way similar to the catalyst of the Frame disclosure.
- V. The range presented in Applicant's specification is such that outside the recited ranges the catalyst will probably not adequately perform as required by the process.
- VI. The process of De Jong involves the oxidation of hydrocarbons which is completely different from the claimed process.
- VII. De Jong does not mention the use of an yttria-stabilized zirconia carrier with the particular combination of active metals of Applicant's catalyst.

29. With respect to Applicant's first, second, third, fourth, and fifth arguments, Examiner notes that such arguments were previously presented for consideration on appeal before the Board of Patent Appeals and Interferences, with the Board finding



them to be unpersuasive, ultimately resulting in affirmance of all rejections made in view of Frame, Yoo, and Mahadev (see decision of the Board of Patent Appeals and Interferences mailed 1 September 2009).

30. With respect to Applicant's sixth argument, Examiner does not consider such argument persuasive because De Jong discloses processing of the same or substantially similar feed using the same or substantially similar oxidation catalyst material at variable conditions of temperature and pressure. In such instance, the person having ordinary skill in the art would reasonably expect that processes carried out on the same or substantially similar feed material using the same or substantially similar catalyst material and with variable process conditions of temperature and pressure that could be adjusted to within the claimed range to have the same effect – i.e. the process of De Jong would be expected to oxidize the sulfur compounds found in the feed material to De Jong's process. In this regard, De Jong notes that sulfur compounds remaining in the effluent stream after oxidation may be removed in a downstream desulfurization unit by contact with a metal oxide adsorbent, similar to Applicant's claim 25 (see De Jong, column 7, lines 51-57; and column 8, lines 11-27).

31. With respect to Applicant's seventh argument, it is commonly known to incorporate yttria into zirconia supports as a means of stabilizing the zirconia against the phase change and accompanying volume expansion of unstabilized zirconia at elevated temperatures (see Mackrodt, column 4, lines 2-7).

***Conclusion***

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 10:00 A.M. to 7:00 P.M. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Randy Boyer/

Examiner, Art Unit 1771